

ART. XXI.—*Australian Fungi.*

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In 1892 a "Handbook of Australian Fungi" was published by Dr. M. C. Cooke, under the authority, and with the assistance, of the several Governments of the Australian colonies. This was a very useful and necessary publication, as it gave workers, or intending workers, in this division of the subject, a substantial basis to start from, and since then various additions have been made. But, as Dr. Cooke points out, the minute fungi requiring a pocket lens for their detection, have been largely over-looked by those collectors who sent home specimens for determination, so much so that, as he states in the introduction, "It is quite probable that in the course of a few years by working up the minute species, the total number contained in this volume would be more than double, even without the investigation of unexplored districts."

It is to these minute species that I am now giving attention, and this first instalment may perhaps encourage other workers in the same field, for truly "the harvest is plenteous, but the labourers are few." I am indebted to several correspondents for a number of the specimens herein described, and they deserve full credit for their praiseworthy labours.

1. Mr. F. Barnard, senior, of Kew, one of the old microscopic workers of the colony, has quite a number of specimens awaiting determination, and as many of them are mounted microscopically, this should facilitate the work.

2. Mr. L. Rodway, of Hobart, Tasmania, who is doing good work among the Phanerogams of that island, has also sent me a number of selected specimens.

3. Mr. G. H. Robinson, of Ardmona, has been most unremitting in his attention to these minute forms. He is a gold medallist of Longerenong Agricultural College as well as a former distinguished student of the School of Horticulture, Burnley, and his trained powers of observation have enabled him to detect many minute

forms of fungi while engaged in his ordinary avocation as a fruit-grower.

The forms recorded are either new to science or to the colonies, or have been found upon new host plants or in fresh localities, and since they are all parasitic fungi, preying upon some form of vegetable life, they are therefore of special interest to the vegetable pathologist.

They are arranged according to the plan laid down in my paper read before the Australasian Association for the Advancement of Science, at Adelaide (1893), on "Botanical Nomenclature, with special reference to Fungi." There are twelve groups altogether, eight of which are represented here. Of the twenty-eight species recorded, eight are new, in addition to one new variety.

GROUP III.—UREDINES.

ORDER UREDINACEÆ.

(1) *Melampsora Lini*, Tul.

Leaves of *Linum marginale*, Hobart, Tasmania (Rodway, 33).

(2) *Puccinia Burchardiae*, Ludw.

Uredospores.—Sori amphigenous, bullate, elliptical or sometimes circular, crowded, light brown, erumpent, surrounded at base by dry cuticle of epidermis.

Uredospores globose or oval, yellowish-brown, episore echinulate, $25 - 28.5\mu$ in dia., or $28.5 - 31.5\mu \times 22 - 25\mu$.

On stem and leaves of *Burchardia umbellata*. October. Cheltenham, near Melbourne, Victoria.

This species was described from South Australia by Professor Dr. F. Ludwig, in "Zeitschrift für Pflanzenkrankheiten," vol. iii., pt. 3, 1893, but no uredospores were found. The above description supplies the omission.

(3) *Puccinia Correae*, McAlp., n. sp.

Hypophyllous. Sori cushion-shaped, circular or interruptedly circular, dirty brown, scattered, soon naked.

Teleutospores yellowish-grey, long stalked, elongated fusoid, constricted at middle; upper cell elongated, tapering and rounded

at apex; lower cell tapering towards base; $44 - 60 \times 17 - 20.5\mu$. Pedicel light grey, several times as long as teleutospore.

Mesospores similarly coloured and stalked, ovoid with truncated apex, $25 - 28 \times 16 - 19\mu$.

On under surface of leaves of *Correa Lawrenciana*. Very common on one bush in damp gully, but never found on any other, although plant is common. December. Eastern slope of Mount Wellington, Tasmania (Rodway, 6).

The sori stand out very distinctly from the cinnamon-brown under surface of the leaves, causing corresponding circular depressions on upper surface, of a yellowish-green colour.

(4) *Puccinia Erechthitis*, McAlp., n. sp.

Æcidiospores.—*Æcidia* on stem and leaves, causing distortion and swelling, pale yellow at first, becoming orange-yellow, arranged close together in lines or irregularly. Pseudoperidia cup-shaped, with white, torn, revolute edges. *Æcidiospores* variable in shape, irregularly round or oval, orange-yellow, smooth, $19 - 16\mu \times 17 - 12\mu$. Very common all the year round, except during middle of summer.

Teleutospores.—Sori for a long time covered by epidermis, black, crowded together and forming a swelling. Teleutospores yellow-brown, pedicellate, elongated, constricted at middle: upper cell dark brown, rounded or pointed and thickened at apex; lower cell usually yellow and tapering towards base, elongated, wedge-shaped, $54 - 57\mu \times 19 - 25\mu$. Pedicels persistent, very pale yellow, to transparent, 38μ long. Found from April to June, but very rare.

On *Erechthites quadridentata*? Ardmona in Goulburn Valley, Victoria (Robinson, 107).

(5) *Puccinia Hieracii*, Mart.

Uredospores.—Sori on upper and less often on under surface of leaves, dark purplish-brown, numerous, scattered, becoming confluent, bullate, surrounded by torn epidermis. Uredospores globose or elliptic, golden-brown, finely echinulate, about 28.5μ in dia., or $33 - 27\mu \times 25\mu$.

Teleutospores.—Along with uredospores. Sori blackish-brown, usually confluent, on much withered basal leaves. Teleuto-

spores reddish-brown, stalked, elliptic, upper and lower cell about same size; upper cell rounded and not thickened at apex, hemispherical; lower cell somewhat similar, but often tapering towards base, average $38 \times 22\mu$, pedicel transparent, deciduous.

On leaves and flowering stems of *Hypochaeris radicata*. All the year round when moisture is present, but especially common about April and May, and September to November. Ardmona, in Goulburn Valley, Victoria (Robinson, 86, 96).

The presence of the fungus seems to check flowering, or at least, to retard development greatly, for healthy plants are met with flowering freely, while diseased specimens are conspicuous by the absence of flowers. The leaves begin by assuming a pale green to yellowish tint, then turn snuff-brown and shrivelled. This form approaches *P. caulicola*, Corda, found by Cooke on *Hypochaeris glabra* from Queensland, and which he considers may possibly be a form of *P. Hieracii*.

(6) *Puccinia Hypochaeris*, McAlp., n. sp.

Æcidiospores and Teleutospores occurring together on both surfaces of leaf.

Æcidiospores.—Pseudoperidia amphigenous, on greenish-yellow to brownish orbicular patches, clustered, orange-yellow, round to elliptical. Æcidiospores subrotund to oval, pale orange-yellow, $14 - 16\mu \times 12.5\mu$.

Teleutospores.—Sori intermixed with æcidia, black, elliptical, sometimes run together, girt by ruptured epidermis, sometimes exactly opposite each other on upper and under surface of leaf. Teleutospores chestnut-brown, pedicellate, constricted at middle; upper cell dark brown, rounded or scoop-shaped, thickened at apex; lower cell pale brown, usually tapering towards base; $47 - 50\mu \times 19 - 23\mu$. Pedicels hyaline, sometimes persistent, about length of one of the cells, viz., 24μ .

On leaves of *Hypochaeris radicata*. October. Ardmona, in Goulburn Valley, Victoria (Robinson, 117).

This species belongs to the group *Pucciniopsis*, Schroet., in which only Æcidiospores and Teleutospores are known, occurring on the same host plant.

(7) *Puccinia Plagianthi*, McAlp., n. sp.

Sori reddish-brown, naked, bullate, scattered. Teleutospores shortly-stalked, yellowish, clavate, slightly constricted in middle; upper cell rounded at apex; lower cell usually tapering towards base, sometimes a counterpart of the upper, similarly coloured; pedicel hyaline, $50 \times 22\mu$.

Very common on leaves and flowers of *Plagianthus sidoides*. August to April. Southern slope of Mount Wellington, Tasmania (Rodway, 11).

(8) *Æcidium eburneum*, McAlp., n. sp.

Æcidia ivory colour becoming brownish, clustered together without definite order. Pseudoperidia cup-shaped, minute, margin finely toothed. Æcidiospores subglobose or elliptical, grey, from 24 to 25μ in diameter, or $25 - 28 \times 19 - 22\mu$. On stems, leaves, flower-stalk, calyx and legumes of *Bossica cinerea*. October and November. Caulfield and Boxhill, near Melbourne, Victoria (Barnard, 1). Bellerine Swamp, Tasmania (Rodway, 15).

In the Tasmanian specimens the æcidia are confined to the fruit.

(9) *Æcidium monocystis*, Berk.

On *Abrotanella forsterioides*. Summit of Mount Wellington, Tasmania (Rodway, 30).

(10) *Æcidium Ranunculacearum*, D. C.

On *Ranunculus parviflorus*. Ardmona in Goulburn Valley, Victoria (Robinson, 90).

GROUP IV.—PYRENOAMYCETES.

ORDER HYPOCREACEÆ.

(11) *Claviceps purpurea*, Tul.

On *Lolium perenne*, *Lolium temulentum*, *Triticum sativum*, etc., Victoria.

ORDER FOLICOLACEÆ.

(12) *Sphaerella Fragariæ*, Sacc.

On leaves of strawberry. Victoria, South Australia, and recorded for New South Wales by Dr. Cobb.

This is becoming a very widespread and serious disease of the strawberry plant.

GROUP V.—DISCOMYCETES.

ORDER PHACIDIACEÆ.

(13) *Pseudopeziza Medicagois*, Sacc.

Sporidia, $9 \times 4.5\mu$.

On both surfaces of leaflets of *Medicago sativa*.

Very common nearly all the year round. Ardmona, in Goulburn Valley, Victoria. (Robinson, 90).

GROUP VII.—HYPHOMYCETES.

ORDER MUCEDINACEÆ.

(14) *Monilia fructigena*, Pers.

On apples, pears, etc. Victoria.

(15) *Oidium Chrysanthemi*, Rabh.

On leaves of chrysanthemum. Victoria.

(16) *Oidium Oxalidis*, McAlp., n. sp.

Broadly effused, greyish, powdery. Hyphæ septate, branched, $4 - 6\mu$ broad. Conidia oval to barrel-shaped, granular, hyaline $31 \times 12\mu$.

Mostly on upper surface of leaves, sometimes on lower, also on leaf-stalks, stem and fruit of *Oxalis corniculata*. Very common, especially on irrigation patches wherever there is moisture. Ardmona, in Goulburn Valley, Victoria. June to November and right through summer on banks of irrigation channels (Robinson, 103).

ORDER DEMATIACEÆ.

(17) *Scolecotrichum graminis*, var. *Avenæ*, Erikss.

On leaves of oats (*Avena sativa*). Victoria.

GROUP VIII.—SPHÆROPSIDES.

ORDER SPHÆRIOIDACEÆ.

(18) *Septoria Dianthi*, Desm.

On carnations. September. Near Melbourne, Victoria.

(19) *Septoria Tritici*, Desm.

On fading leaves of wheat, also stem and ear. Victoria, and recorded for New South Wales by Dr. Cobb.

(20) *Phleospora Mori*, Sacc.

On leaves of mulberry. Victoria.

ORDER MELANCONIACEÆ.

(21) *Marsonia deformans*, Cooke and Mass.

On leaves and stipules of cultivated peas. September. South Australia.

GROUP X.—USTILAGINES.

ORDER USTILAGINACEÆ.

(22) *Ustilago Allii*, McAlp., n. sp.

Sori forming minute dark coloured pustules in parallel lines along veins of scale leaves of bulb, at first covered by the epidermis, then pulverulent, black, in streaks or blending into masses.

Resting-spores dark brown, spherical, echinulate, imbedded in gelatinous mass, $4 - 4\frac{1}{2}\mu$. in dia. Jointed mycelium here and there in gelatinous mass, 3μ . broad. On scale leaves of stored onion bulbs. Ardmona, in Goulburn Valley, Victoria. (Robinson, 97).

(23) *Ustilago Poarum*, McAlp., n. sp.

Only found on stunted plants so far, distorting, discolouring, and forming black powdery masses, especially on the foliage.

Resting-spores globose or irregularly spherical, yellowish-brown, epispore echinulate, $12\frac{1}{2}\mu$ in dia., or $14 \times 12\frac{1}{2}\mu$.

On very small specimens of *Poa annua*, growing in hard ground. October. Ardmona, in Goulburn Valley, Victoria (Robinson, 82).

(24) *Urocystis occulta*, Preuss.

On wheat plants, very destructive to crop. Victoria; and recorded for New South Wales by Dr. Cobb.

GROUP XI.—PHYCOMYCETES.

ORDER PERONOSPORACEÆ.

(25) *Peronospora parasitica*, De Bary., var. *Lepidii*, McAlp.

Dense white mould on leaves and other parts of plant, which soon curl, and the fungus forms a felt almost covering the entire surface.

Gonidiophores straight, averaging 6μ thick. Gonidia elliptical, pale grey, $35-41\mu \times 19-22\mu$; membrane about 1μ thick, hyaline, protoplasm granular, with a homogeneous layer between it and membrane, germ-tube issuing laterally.

On leaves, stems and fruit of *Lepidium ruderale*, causing distortion. The lower surface of leaf is attacked first, causing it to curl up. After autumn rains and in spring. Ardmoua, in Goulburn Valley, Victoria (Robinson, 108).

The variety principally differs from *P. parasitica* in the stalk of the gonidiophore being straight and not flexuous, and in the shape and size of the gonidia, being sometimes twice as long as broad, and altogether larger.

(26) *Peronospora Schleideni*, Unger.

Common on leaves of onion, shallot, and various species of *Allium*. Victoria.

ORDER ENTOMOPHTHORACEÆ.

(27) *Empusa Muscæ*, Cohn.

On dead house flies (*Musca domestica*). Victoria.

GROUP XII.—MYXOMYCETES.

(28) *Plasmodiophora Brassicæ*, Wor.

Causing "club-root" in turnips, cabbages, cauliflower,* and other cruciferous plants. Victoria.